



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/919,742	07/31/2001	James A. Moorer	M-11445 US	3946
22242	7590	10/20/2005	EXAMINER	
FITCH EVEN TABIN AND FLANNERY 120 SOUTH LA SALLE STREET SUITE 1600 CHICAGO, IL 60603-3406			CHAU, COREY P	
			ART UNIT	PAPER NUMBER
			2644	

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/919,742

Applicant(s)

MOORER, JAMES A.

Examiner

Corey P. Chau

Art Unit

2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-31,33-46 and 48-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 4-15 is/are allowed.
- 6) ☒ Claim(s) 16,22-31,33-35,38-46 and 48-56 is/are rejected.
- 7) ☒ Claim(s) 17-21 and 36-37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the amendment filed on May 02, 2005 in which claims 2-3, 32, and 47 are cancelled and claims 1, 4-31, 33-46, and 48-56 are pending.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "first set of microphones is configured to produce cardioid pickups in a first direction, and a second set of microphones configured to produce cardioid pickup in a second direction opposite the first direction such that the planar array establishes substantially equal angular resolution in both the first and second directions" utilized in the microphone system as discloses in claim 16 and 35, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

Art Unit: 2644

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 38 is objected to because of the following informalities: on line 3, recites "the delay", which should be replaced with "a delay". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16, 35, 41, 48, 54, and 55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Regarding Claim 16, Applicant discloses "the axes are nondegenerate" on lines 6-7, which it unclear to the Examiner how the axes are nondegenerate. Applicant has not clearly discloses the details on how the axes are nondegenerate. In addition, Applicant discloses "wherein a first set of microphones is configured to produce cardioid pickups in a first direction, and a second set of microphones configured to produce cardioid pickup in a second direction opposite the first direction such that the planar

Art Unit: 2644

array establishes substantially equal angular resolution in both the first and second directions". It is unclear to the Examiner as to how "a first set of microphones is configured to produce cardioid pickups in a first direction, and a second set of microphones configured to produce cardioid pickup in a second direction opposite the first direction such that the planar array establishes substantially equal angular resolution in both the first and second directions" would work with the planar array of plurality of a plurality of microphones, the plurality of microphone signal adders, **wherein the microphones of each set of microphones forming a line having one of said spacings parallel to one of said axes are connected to the same adder,** and the plurality of first filters.

Claim 35 is rejection for similar reasons as stated above.

6. The term "substantially" in claim 16, line 17 is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

7. Claim 35 is rejection for similar reasons as stated above

8. Claim 41 recites "providing a plurality of microphones;
arranging the microphones according to pluralities of distinct regular spacing;
applying one of plurality of windowing functions to an output of each of the plurality of microphones, wherein each of the windowing functions is a function of one of the pluralities of spacings associated with the microphone with which the windowing function is applying;

combing the outputs of the microphones of each spacing to provide a respective combined signal for the spacing". However the specification and drawing discloses providing a plurality of microphones;

arranging the microphones according to pluralities of distinct regular spacing;

applying one of plurality of windowing functions to an output of each of the plurality of microphones, wherein each of the windowing functions is a function of one of the pluralities of spacings associated with the microphone with which the windowing function is applying;

combing the outputs of the **one of plurality of windowing functions** of each spacing to provide a respective combined signal for the spacing. Therefore, it renders the claim indefinite because it does not clearly disclose the invention (the claim needs to clearly disclose the step of combining is after the plurality of windowing function).

9. Claim 48 depends on claim 47, which has been canceled. Therefore it is unclear to the Examiner the dependency of claim 48. For examining purposes, claim 48 depends on claim 41.

10. Regarding Claim 54, Applicant discloses "each planar array are nondegenerate" on line 6, which is unclear to the Examiner how each planar array are nondegenerate. Applicant has not clearly disclosed the details on how each planar array are nondegenerate.

11. Claim 55, recites "causing to be provided a plurality of signals from an array of microphones arranged according to a plurality of regular spacings;

providing a direction;

Art Unit: 2644

delaying the signals within each spacing relative to each other;

equalizing the main lobe of each microphone output by applying one of a plurality of windowing functions relating to the spacing of the microphone;

combining the delayed signals within each spacing". However the specification and drawing discloses causing to be provided a plurality of signals from an array of microphones arranged according to a plurality of regular spacings;

providing a direction;

delaying the signals within each spacing relative to each other;

equalizing the main lobe of each microphone output by applying one of a plurality of windowing functions relating to the spacing of the microphone;

combining **output of the plurality of windowing function** within each spacing.

Therefore, it renders the claim indefinite because it does not clearly disclose the invention (the claim needs to clearly disclose the step of combining is after the plurality of windowing function).

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2644

13. Claims 16, 22-31, 33-35, 39-46, and 51-54 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5684882 to Mahieux et al (hereafter as Mahieux).

14. Regarding Claim 16, as best understood with regards to 112, 2nd problem mention above, Mahieux discloses a microphone system (Fig. 1a) comprising: a planar array of a plurality of microphones regularly spaced in the direction of a first axis according to a pluralities of first spacings centered on a second axis and regularly spaced in the direction of the second axis according to a pluralities of second spacings centered on the first axis, wherein the axes are nondegenerate (Figs. 1a-c); a plurality of microphone signal adders (2_1 to 2_4), wherein the microphones of each set of microphones forming a line having one of said spacings parallel to one of said axes are connected to the same adder (column 6, line 21 to column 7, line 12); a plurality of first filters (4_1 to 4_4), each connected to receive the output of a corresponding one of the microphones signal adders; an output adder (5) connected to receive the output of the filters and supply the combined signal as an output; and wherein a first set of microphones is configured to produce cardioid pickups in a first direction, and a second set of microphones configured to produce cardioid pickup in a second direction opposite the first direction such that the planar array establishes substantially equal angular resolution in both the first and second directions (i.e. the electro-acoustic transducer M_0 to M_{10} consist for example of microphones and are intended to receive the useful signals summed in phase, **the sound signals originating from areas other than the**

useful area L being summed out of phase in order to select the sound signals arising from the aforesaid useful speaking area)(column 3, lines 33-47).

15. Regarding Claim 22, Mahieux discloses the frequency response of each of the first filters is a continuous function of frequency (f_1 to f_4), the response of the first filter corresponding to the smallest spacing being zero below a first frequency (f_4), constant above a second frequency and linear between the first and second frequency, the response of the first filter corresponding to the largest spacing being zero above a third frequency (f_1), constant below a fourth frequency and linear between the third and fourth frequency, and wherein for each of the other first filters, the response is zero outside of a respective frequency range and inside the respective frequency range linearly increasing below a respective intermediate frequency and linearly decreasing above the respective intermediate frequency (Figs. 6a and 6b).

16. Regarding Claim 23, Mahieux discloses the selected frequency range is greater than five octaves (column 1, lines 49-55).

17. Regarding Claim 24, Mahieux discloses the selected frequency range is from 20 hertz to 20 kilohertz (column 1, lines 49-55).

18. Regarding Claim 25, Mahieux discloses the number of spacing is N_1 and the first spacings are $2 \cdot \sup_{i=1}^{N_1} d_1$, where i runs from one to N_1 and d_1 is the smallest spacing in the direction of the first axis, and wherein the number of second spacings is N_2 and the second spacing are $2 \cdot \sup_{j=1}^{N_2} d_2$, where j runs from one to N_2 and d_2 is the smallest spacing in the direction of the second axis (Fig. 1a).

19. Regarding Claim 26, Mahieux discloses N_1 and N_2 are equal to nine (Fig. 1a).

20. Regarding Claim 27, Mahieux discloses d_1 and d_2 are in a range of 0.5 centimeters to ten centimeter (column 4, lines 47-57).
21. Regarding Claim 28, Mahieux discloses the number of microphones corresponding to each of the first and second spacing is three or more (Fig. 1a).
22. Regarding Claim 29 Mahieux discloses a microphone belongs to a plurality of the sets of microphones having one of said spacing (Fig. 1a).
23. Regarding Claim 30, Mahieux discloses $d_{\text{sub.1}}$ is equal to $d_{\text{sub.2}}$. (Fig. 1a)
24. Regarding Claim 31, Mahieux discloses the axes are orthogonal (Figs. 1b-1c)
25. Regarding Claim 33, Mahieux discloses a number of the microphone systems of claim 16, wherein the planar arrays are non-coplanar and the number is two or more (Fig. 1a).
26. Regarding Claim 34, Mahieux discloses number is two, wherein the planar arrays are orthogonal, and wherein the axes in the planar arrays are orthogonal (Fig. 1a).
27. Claim 35 is essentially similar to Claim 16 and is rejected for the reasons stated above apropos to Claim 16.
28. Claim 39 is essentially similar to Claim 23 and is rejected for the reasons stated above apropos to Claim 23.
29. Claim 40 is essentially similar to Claim 24 and is rejected for the reasons stated above apropos to Claim 24.
30. Regarding Claim 41, as best understood with regards to 112, 2nd problem mention above, Mahieux disclose a method of providing a directional audio response that is flat over a frequency range, comprising: providing a plurality of microphone (Fig.

Art Unit: 2644

1a); arranging the microphones according to pluralities of distinct regular spacings (Fig. 1a); applying one of plurality of windowing functions to an output of each of the plurality of microphones, wherein each of the windowing functions is a function of one of the pluralities of spacings associated with the microphone with which the windowing function is applying (Fig. 5a); combining the outputs of the microphones of each spacing to provide a respective combined signal for that spacing (Figs. 1a); filtering each of the combined outputs according to a respective frequency response (Figs. 1a and 5a); and combining the filtered combined outputs, where the spacings and the respective filter responses are related such that the combined filtered output is flat over the frequency range (Fig. 1a).

31. Regarding Claim 42, Mahieux discloses microphones are arranged collinearly and the distinct spacing share a common center (Figs. 1b-1c).

32. Claim 43 is essentially similar to Claim 25 and is rejected for the reasons stated above apropos to Claim 25.

33. Claim 44 is essentially similar to Claim 26 and is rejected for the reasons stated above apropos to Claim 26.

34. Claim 45 is essentially similar to Claim 27 and is rejected for the reasons stated above apropos to Claim 27.

35. Claim 46 is essentially similar to Claim 28 and is rejected for the reasons stated above apropos to Claim 28.

36. Claim 51 is essentially similar to Claim 22 and is rejected for the reasons stated above apropos to Claim 22.

Art Unit: 2644

37. Claim 52 is essentially similar to Claim 23 and is rejected for the reasons stated above apropos to Claim 23.

38. Claim 53 is essentially similar to Claim 24 and is rejected for the reasons stated above apropos to Claim 24.

39. Regarding Claim 54, as best understood with regards to 112, 2nd problem mention above, Mahieux discloses the microphones are arranged in one or more planar arrays, the microphones of each planar array being regularly spaced in the direction of a first axis according to a plurality of first spacing centered on a second axis and regularly spaced in the direction of the second axis according to a plurality of second spacings centered on the first axis, wherein the axes of each planar array are nondegenerate (Figs. 1a-1c).

Claim Rejections - 35 USC § 103

40. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

41. Claims 38, 49-50, and 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5684882 to Mahieux in view of U.S. Patent No. 4741038 to Elko et al (hereafter as Elko).

42. Regarding Claim 38, Mahieux does not expressly disclose causing a delay of the responses of the microphones prior to combining the response, whereby directional

Art Unit: 2644

response to the audio signal is peaked in the selected direction. Elko discloses a delay in order to point the array beam in any desired direction (column 7, lines 9-13).

Therefore it would have been obvious to one having ordinary skill in the art to modify Mahieux with the teaching of Elko to utilize a delay after the microphones in order to point the array beam in any desired direction.

43. Claim 49 is essentially similar to Claim 38 and is rejected for the reasons stated above apropos to Claim 38.

44. All elements of Claim 50 are comprehended by Claim 38. Claim 50 is rejected for the reasons stated above apropos to Claim 38.

45. Claim 55 is essentially similar to Claims 41 and 49 and is rejected for the reasons stated above apropos to Claims 41 and 49.

46. Regarding Claim 56, Mahieux as modified does not expressly disclose the plurality of signals from an array of microphones are provided from a pre-recording of said signals. However the Examiner takes Official Notice that any known input signals such as pre-recording signals can be utilized, which is not limited by the disclosure of Mahieux as modified, in order to provide flexibility and testing of the system. Therefore it would have been obvious to one having skill in the art to modify Mahieux as modified to utilize any known input signals such as a pre-recording signals, which can be provided by the multimedia computer workstation where the microphone array is installed on in order to provide flexibility and testing of the system.

47. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5684882 to Mahieux.

Art Unit: 2644

48. Regarding Claim 48, as best understood with regards to 112, 2nd problem mention above, Mahieux discloses a window function, however it would have been obvious to one having ordinary skill in the art to utilize any known windowing function, such as a Kaiser-Bessel window functions to obtain the desired output. Therefore it would have been obvious to one having ordinary skill in the art to modify Mahieux to utilize Kaiser-Bessel window functions in order to obtain the desired output.

Allowable Subject Matter

49. Claims 1, 4-15 are allowed.

50. Claims 17-21 and 36-37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

51. Applicant's arguments filed 5/02/2005 have been fully considered but they are not persuasive.

52. With respect to Applicant's argument on page 17, stating that "Mahieux patents '170 and '882 fail to teach or suggest a filter that implements a windowing function that varies with the spacings of each microphone to each output of the plurality of microphones. Therefore, amended claims 1, 41, and 55 and all claims dependent on these claims are now in condition for allowance", has been noted. However regarding claims 41 and 55, the Examiner respectfully disagrees. Claim 41 and 45 does not

Art Unit: 2644

clearly disclose the step of combing is after the plurality of windowing function, as mention above in 112, 2nd section. Therefore, the plurality of windowing functions can be interpret as any windowing functions such as that of Mahieux '882, see Fig. 1a.

53. With respect to Applicant's argument on page 17, stating that "Mahieux '882 and '170 patents fails to teach or suggest a first set and a second set of microphones configured in a manner such that microphones in a signal array may pick up sound in opposite direction with substantially equal angular resolution", has been noted. However the Examiner respectfully disagrees. As mention above in the 112, 2nd section, it is unclear to the Examiner as to how "a first set of microphones is configured to produce cardioid pickups in a first direction, and a second set of microphones configured to produce cardioid pickup in a second direction opposite the first direction such that the planar array establishes substantially equal angular resolution in both the first and second directions" would work with the planar array of plurality of a plurality of microphones, the plurality of microphone signal adders, **wherein the microphones of each set of microphones forming a line having one of said spacings parallel to one of said axes are connected to the same adder**, and the plurality of first filters. As best understood, Mahieux discloses the electro-acoustic transducer M_0 to M_{10} consist for example of microphones and are intended to receive the useful signals summed in phase, **the sound signals originating from areas other than the useful area L being summed out of phase** in order to select the sound signals arising from the aforesaid useful speaking area, which reads on "a first set of microphones is configured to produce cardioid pickups in a first direction, and a second set of microphones

Art Unit: 2644

configured to produce cardioid pickup in a second direction opposite the first direction such that the planar array establishes substantially equal angular resolution in both the first and second directions". See column 3, lines 33-47.

54. In response to applicant's argument that "Elko does not teach or suggest a "plurality of windowing functions". Further, Elko does not teach or suggest multiple windowing functions where each function depends on the microphone's distinct spacing", the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Conclusion

55. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

Art Unit: 2644


shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

56. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Corey P. Chau whose telephone number is (571)272-7514. The examiner can normally be reached on Monday - Friday 9:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chin Vivian can be reached on (571)272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

October 17, 2005
CPC



VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600